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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,187	08/29/2001	Kristy A. Campbell	MI22-1742	8497

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WASHINGTON, DC 20037-1526

EXAMINER

DUONG, KHANH B

ART UNIT PAPER NUMBER

2822

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Supplemental  
Notice of Allowability**

Application No.

09/943,187

Examiner

Khanh Duong

Applicant(s)

CAMPBELL ET AL.

Art Unit

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.


1. ☒ This communication is responsive to the communication filed February 18, 2004.
2. ☒ The allowed claim(s) is/are 1-51.
3. ☒ The drawings filed on 29 August 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 4/2/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
**Michael Trinh**  
Primary Examiner  
Act SPE

### **DETAILED ACTION**

This Office Action is in response to the communication filed February 18, 2004.

#### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on April 2, 2004 is considered by the examiner.

#### ***Examiner's Amendment***

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

#### **In the Title:**

Please amend the title as follows: --METHOD OF FORMING CHALCOGENIDE COMPRISING DEVICES AND METHOD OF FORMING A PROGRAMMABLE MEMORY CELL OF MEMORY CIRCUITRY--

#### ***Allowable Subject Matter***

Claims 1-51 are allowed.

The following is an examiner's statement of reasons for allowance: none of the prior art of record shows or fairly suggests all the process limitations as claimed. Specifically,

Re claim 1, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *irradiating the silver effective to break a chalcogenide bond of the chalcogenide material at an interface of the silver comprising layer and chalcogenide*

*material and diffuse at least some of the silver into the chalcogenide material, and forming an outer surface of the chalcogenide material; after the irradiating, exposing the chalcogenide material outer surface to an iodine comprising fluid effective to reduce roughness of the chalcogenide material outer surface from what it was prior to the exposing; and after exposing, depositing a second electrode material over the chalcogenide material, and forming the second conductive electrode material into an electrode of the device.*

Re claim 11, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *after forming the chalcogenide comprising material, forming  $\text{Ag}_2\text{Se}$  over the chalcogenide comprising material; exposing the  $\text{Ag}_2\text{Se}$  to an iodine comprising fluid effective to etch away at least some of the  $\text{Ag}_2\text{Se}$ ; and after the exposing, depositing a second conductive electrode material over the chalcogenide material and forming the second conductive electrode material into an electrode of the device.*

Re claim 20, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *after forming the chalcogenide comprising material, forming a discontinuous layer of  $\text{Ag}_2\text{Se}$  over the chalcogenide comprising material; exposing the  $\text{Ag}_2\text{Se}$  to an iodine comprising fluid effective to etch away at least some of the  $\text{Ag}_2\text{Se}$ ; and after the exposing, depositing a second conductive electrode material over the chalcogenide material, and which is continuous and completely covering at least over the chalcogenide material, and forming the second conductive electrode material into an electrode of the device.*

Re claim 26, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *irradiating the silver effective to break a chalcogenide bond of the chalcogenide material at an interface of the silver comprising layer and chalcogenide*

*material and diffuse at least some of the silver into the chalcogenide material, the irradiating being effective to form a discontinuous layer of  $\text{Ag}_2\text{Se}$  over the chalcogenide comprising material, the irradiating being effective to maintain the chalcogenide material underlying the  $\text{Ag}_2\text{Se}$  in a substantially amorphous state; after the irradiating, exposing the  $\text{Ag}_2\text{Se}$  to an iodine comprising fluid effective to etch away at least a majority of the  $\text{Ag}_2\text{Se}$ ; and after exposing, depositing a second electrode material over the chalcogenide material, and which is continuous and completely covering at least over the chalcogenide material, and forming the second conductive electrode material into an electrode of the device.*

Re claim 34, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *irradiating the metal-containing layer to break a chalcogenide bond of the chalcogenide glass layer at the interface of the metal-containing layer and chalcogenide glass layer, such that at least a portion of the metal-containing layer diffuses into the chalcogenide glass layer; and after the step of irradiating, exposing an outer surface of the chalcogenide glass layer to an iodine comprising fluid, wherein the iodine comprising fluid removes at least a portion of the outer surface that has been irradiated.*

Re claim 42, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *irradiating the metal-containing layer to break a chalcogenide bond of the chalcogenide glass layer at the interface of the metal-containing layer and chalcogenide glass layer thereby creating an outside surface; removing at least a portion of the outside surface by etching with an iodine comprising fluid; and, after the step of removing at least a portion of the outside surface, forming a second conductive layer over at least a portion of the outside surface remaining after the act of removing.*

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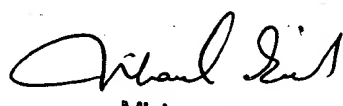
Re claim 51, none of the prior art of record discloses, in addition to other elements or processes as claimed, the steps of: *irradiating the metal-containing layer to break a chalcogenide bond of the chalcogenide glass layer at the interface of the metal-containing layer and chalcogenide glass layer thereby creating an outside surface; the step of irradiating is effective to form  $Ag_2Se$  as at least part of the outside surface; removing at least a portion of the outside surface by etching with an iodine comprising fluid, said etching being effective to etch away at least some of the  $Ag_2Se$ ; and, after the step of removing at least a portion of the outside surface, forming a second conductive layer over at least a portion of the outside surface remaining after the act of removing.*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
KBD

  
Michael Trinh  
Primary Examiner  
Art SBE